August 12, 1960

Dear Doc:

During the discussions with Milt and you on July 14, 1960 and later with Milt on August 5, 1960, some time was spent on supply and take-up spools for the project. We had not received Milt's letter of July 26 prior to the last trip to Norwalk so the thinking on shipping methods outlined below does not reflect some of the suggestions in Milt's correspondence. Milt, however, agreed that as long as he was supplied adequate film and take-up spools, he would be satisfied with any system we might mutually determine.

We suggest that the film supply spools be fabricated and stocked by the Eastman Kodak Company. We propose to package the core and film supply in a shipping flange configuration so designed as to insure uniform film stack on the spool and a protected flange during shipment. We believe that the shipping flange configuration can be packed in the current "B" boxes. This will probably require some minor box modification. If possible, we would use the B flanges in this container. We will supply complete information as soon as it is available.

One method which permits the shipping flanges to clamp either on the film or on the core by inversion of a spacer which drops into a recess on one of those flanges is shown in the accompanying sketch. The core which would fit over the film supply drive would also be adaptable to a removable winding mandrel usable on our spooling machines. We also propose that the take-up spool and film be shipped in a separate container from the supply film.

Although the enclosed sketch diagrams a plywood lined outer box, our latest thinking is along the lines of making this a permanent box rather than a temporary one. The film and take-up spool would be protected in a similar manner to that used for the supply spools. In other words, the shipping flanges would clamp on the film when the spool is loaded and would clamp the spool itself when that spool was empty. We will request a spool flange and inner and outer box design following this general concept. The outer box may be either square or round depending upon protective packing technique.

We will prepare and forward an estimate for the casting procurement and machining necessary for the fabrication of the take-up spools per the drawings submitted by Milt on August 6, 1960.

It is our feeling that perhaps 5 to 10 take-up spools per configuration would satisfy all test and operational requirements. We would be prepared to inspect the take-up spool after the film had been removed for processing and would presume that it would again be checked on the use site prior to installation in the configuration.

Inasmuch as a copy of this correspondence is being directed to Milt, I could perhaps answer some of the questions which were brought up during our last meeting.

Trip Report
P and E, Norwalk, Conn.
July 14, 1960

Project: OX

Subject: Preliminary discussion: Film, supply spool core, take-up spool.

Those in attendance; Doc W, HLE, DC, MR.

Some known final requirements for the P and E configuration are as follows:

1. Film width: 6.600"
2. Format width: 6.350"
3. Length required for mission: 5,000 feet.
4. Film support: Thin base polyester.
5. Emulsion: SO 243 or equivalent.

MR discussed overall plans in a general way. He again stressed the point that if film were wound accurately on a supply spool, P and E would have no problems with tracking. (This seems somewhat optimistic through the six air twisters and at least fifteen roller path.) He mentioned that splices would be a problem as they are planning to use a capacity tuned type position checking mechanism. (Our experience with the development of this type of a device showed it to need quite a bit of electronics to ensure satisfactory performance.)

The information from Kodak Park pertinent to splices was given Milt, i.e. "A mylar tape splice has a design aim of 5 mils for total tape build-up plus the support thickness. Because of average tape thicknesses and some slight irregularities in application, experience has shown that splices may be as thick as but never greater than 8 to 9 mils. This thickness presumes thin base film and normal splicing materials and may be reduced by special considerations."

Until such time that further information is available or until production use of a thermal or welding type splice is accomplished, MR will use the 8 to 9 mil maximum figure for calculations.

P and E would naturally like to see the full load without splices but also realise the improbability of this desire.

P and E would like Doc to order film so that deliveries are made on or before December 1, 1960. First deliveries need only to satisfy physical characteristics and will only be used in film handling tests. Photographic quality film will be needed some time after the first of the year. Lengths as short as 2000 feet would be acceptable if the 5000 foot rolls are not immediately available.

Doc categorically stated that at this time he would not consider any operation which requires re-spooling the film before or after the mission.

Evenness of wind from a given reference point of a total of .016" per Kodak Park's data was given MR (±.008 from a mid point or a total of .016" which is usually in one direction from the starting point). The information that one convolution would never deviate more than .003" from its adjacent convolution was also given MR.

The offered values seemed satisfactory to Don C although he was going to make a further check.

Doc asked that both P and E and EK Company give careful consideration to the operational film handling problems.

Some of the questions to be discussed at subsequent meetings are:

1. Can "B" boxes be used? (Answer is probably NO)

2. Can EK supply a core compatible with our winding requirements which also is readily adaptable to the P and E drive requirement?

3. Does EK wish to supply the outer take-up spool per P and E's requirements?

4. Should supply and take-up core and shipping flanges always be shipped in sets? What other system might be established?

A first look seems to make evident the fact that a new box and shipping flange configuration must be used. (As an observation, it may be possible to use the "B" boxes for the EK configuration film.)

The mock-up of the P and E camera path and a working model of the coaxial spools was seen. By a conservative description, the configuration is frightening.

Our current efforts should be directed toward coordinating the spool and shipping container preliminary design so that as soon as P and E freeze on the exact mechanical requirements we are in a position to supply correct width film on compatible spools.

B. L. E.

BLE:LB

Trip Report
P-E, Norwalk, Conn.
August 5, 1960

Subject: Engineering Conference - Project 40805

Those in attendance: DC, MR, SLE.

The building layout for project test and operation was discussed. P-E have left the space allocation essentially as determined previously. The suggestion was made that air conditioning unit efficiency would be higher if the unit could be centrally located, perhaps as a roof installation. This suggestion will be forwarded to Headquarters to balance structural load requirements against duct work and unit size requirements.

The power and lighting requirements for P-E were also noted. The overall policy still is "think big". I can not become accustomed to expecting the same conveniences at a test and operational site as found in the home factory. P-E have dropped their necessary power requirement from 25 kw to 13 kw. Under pressure from Headquarters I also agreed that the figure of 62 kw was perhaps just as reasonable as 75 kw for the EK portion. This concession seemed to be what was wanted and the total building consumption is at 75 kw or about at the level we had originally estimated.

We were given prints of the work P-E had done and should review their suggestions, add our own requirements and return the drawings as soon as possible so that Headquarters can be made fully cognizant of P-E and our own operational needs. The prints represent thoughts on power, lighting, air conditioning, ducting, safety, communications, etc.

Further film requirements were discussed with Don and Milt. P-E is presently considering the possibility of adding leader and trailer to the film so that the configuration would never have to be unloaded. (I presume that it has finally dawned upon them what a frightening mess they have created with all of the rollers and twisters.)

It is highly desirable that we establish the exact film characteristics in respect to pelloid, backing dye (if any), and other factors which affect loading and unloading supply or take-up film.

Approximately 25 feet of 9 1/2" 8402 triacetate and several sheets of polyester 5 1/2" x 10" were left with Don C for a series of grating tests which he is planning to make. The purpose of the grating will be to check uniformity of film path over the air twisters.

The P-E configuration exposes from the recording optical system in an area approximately .200" wide between two rollers. Initial tests indicate that free film between two rollers is not flat enough to be usable even though considerable tension is applied. Current thoughts are to use a back-up platen made from highly polished chrome steel or even optical polished sapphire. The dangers of a scrubbing platen were pointed out. Use of small rollers tangent to the film at the focal plane or an air platen were suggested as possible solutions. It seems very risky to attempt to draw 5000 feet of film across two

stationary bars in the system even though precautions to ensure cleanliness are observed. Hardness of the pelloid will be very critical in this type of handling. Incidentally, P-E again asked if there were better cleaning techniques available than we are now using to remove any possible edge dirt.

P-E was using coefficient of friction measurements which had previously been supplied for their drive and capstan calculations.

Representative values which they wished to have verified for final film are as follows:

	Pelloid Side	
	Static	Kinetic
Brass	.34	.35
Stainless	.28	.31
Formica	.55	.51
Aluminum	.26	.26
Low Carbon Steel	.37	.36

25X1A (A check of our files indicates that these are the values transmitted by [redacted] on December 4, 1959 and are referenced as applicable to a thin base film.)

Our best information on possible thickness and tolerance was stated as being somewhere around 3.19 to 3.30 mils with a support tolerance of perhaps as great as ±.0002". It was pointed out that these figures are only a guide and do not represent the final film specifications which will be supplied by Kodak Park. Don C is worried that he must have mission film whose maximum variation in thickness is less than ±.0001". (He didn't offer any suggestions as to how he measures or we manufacture.)

P-E would like us to perform a shock test on a film spool to determine magnitude of telescoping and also ascertain feasibility of changing winding tension to minimize telescoping. They would like the data on 5000 feet of mission width film (6.600") wound on a 5.375" core. The data should include shocks of 1 1/2, 2 and 3 G's in direction of the spool axis. They would also like to know the effect of continued acceleration forces in line with the spool axis in an attitude representing vehicle climb. They are still talking no spool flanges in the configuration and no film caging at any time.

25X1A Drawings of the film design for supply and take-up spool were received. The magnesium casting for the outer spool was fabricated by [redacted] 25X1A Machining was performed by [redacted]

25X1A

25X1A A possible method of shipping flanges and spools was discussed per the enclosed chart. P-E is agreeable with the approach although did not wish to take a strong position as to the operational feasibility. They are agreeable to any solution which gives them film on usable spools and an adequate source for take-up spools. We should discuss our proposal problems with Doc W.

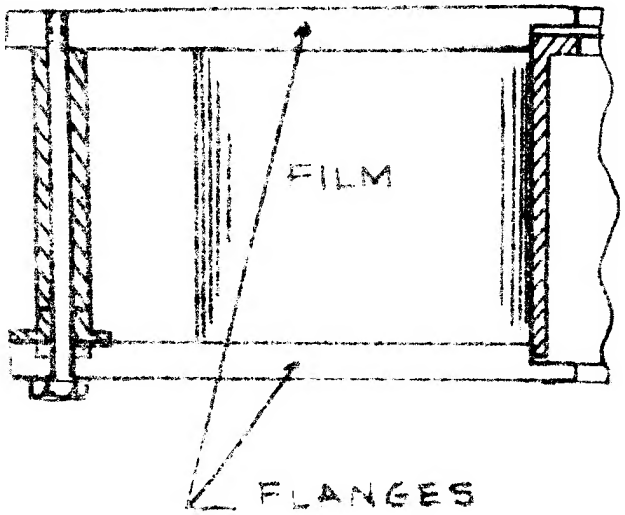
P-E wishes to know whether or not the differences between coefficients of expansion of magnesium spools and film might be enough to cause spool distortion during operations. (Based on the assumption that the film would be a good heat sink and might not change temperature as rapidly as the metal spools.)

B. L. E.

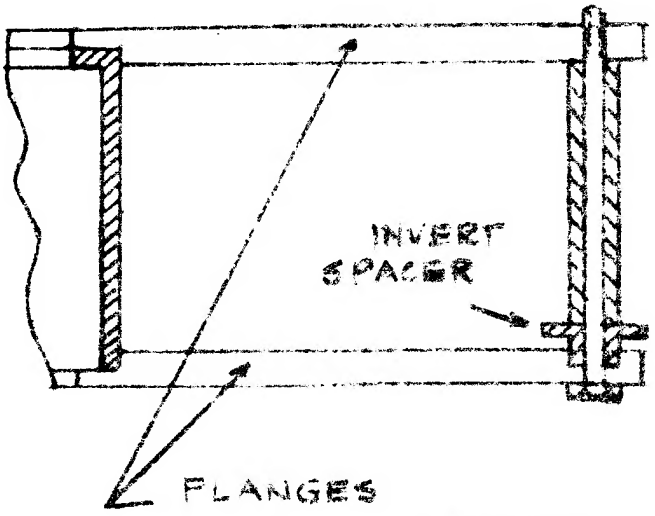
BLE:LB
Enc.
cc: J.L.B.
E.L.G.
J.S.M.
A.B.S.

SUPPLY

LOADED

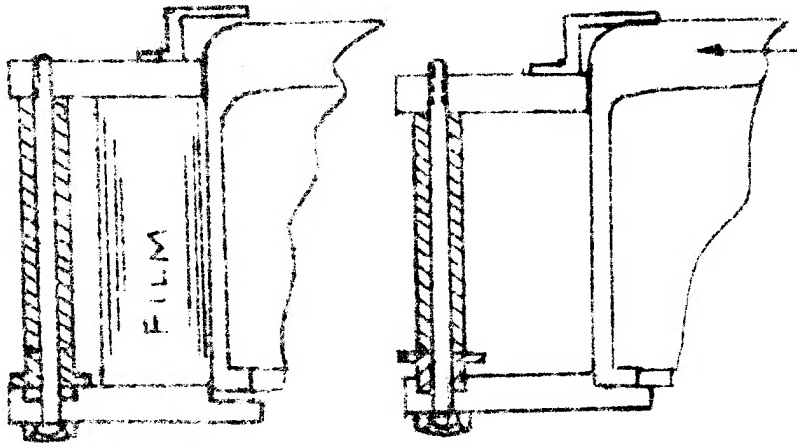


EMPTY



PACK IN "B" BOX
(USE WINDING MANDREL ON SPOOLING MACHINE)

TAKE UP



LOADED - CLAMP AGAINST FILM

EMPTY - CLAMP AGAINST CORE

PAY BOX (LINED)